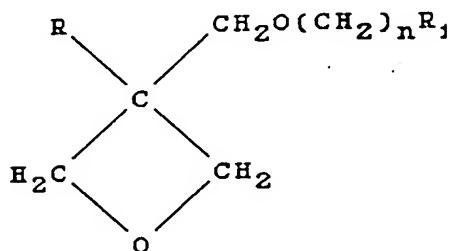


What is claimed is:

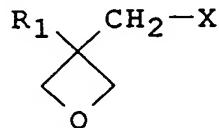
1. A method of making a mono-substituted fluorinated oxetane (FOX) monomer having the structure:



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where n is 1 to 3, R is methyl or ethyl, and R_f is linear or branched chain fluorinated alkyl and isoalkyl having from 1 to 20 carbons or oxa-perfluorinated polyether, having from 4 to about 10 60 carbons comprising the steps of:

a) providing a mono-substituted oxetane premonomer having the structure:



15

where R₁ is selected from the group consisting of methyl and ethyl and X is a leaving group selected from the group consisting of bromo, chloro, iodo and aryl sulfonate, said premonomer being dissolved in a solvent to provide a premonomer solution;

20 b) charging a reaction vessel with an aqueous solution of said mono-substituted oxetane premonomer, a fluoroalcohol, a

phase transfer catalyst and a strong base; and

c) heating said solution to a temperature of 80-85°C until reaction is complete to form the FOX monomer as a separate
25 organic layer.

2. A method of making a mono-substituted FOX monomer as in claim 1 which includes the steps of:

a) cooling the reaction mixture; and

b) separating the mono-substituted FOX monomer as an
5 organic layer from the aqueous reaction mixture.

3. A method of making a mono-substituted fluorinated oxetane monomer as in claim 1 wherein:

a) said fluorinated alcohol is selected from the group consisting essentially of trifluoroethanol, heptafluorobutanol, pentadecafluoroctanol, tridecafluoroctanol, other fluorinated alcohols having the following formulas:

a) HO(CH₂)_n(CF₂)_x-F ;

15 b) HOCH₂CF₂(OCF₂CF₂)_x-F ;

c) HOCH₂CF(OCF₂CF)_x-F ;
 | |
 F₃C CF₃

20 wherein n is 1 to 3 and x is 1 to 20 and mixtures thereof.

4. A method of making a mono-substituted FOX monomer as in claim 3 wherein:

a) said phase transfer catalyst is selected from the group consisting essentially of tetrabutylammonium bromide, tetraethylammonium bromide, trimethylbutylammonium bromide, 5 tetratmethylammonium iodide, cetyltributylammonium bromide, crown ethers, glycols and mixtures thereof.

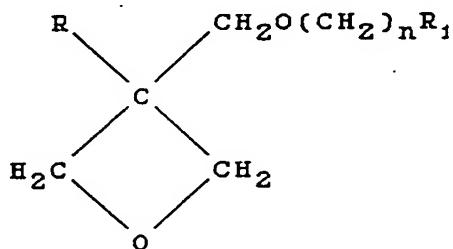
5. A method of making a mono-substituted FOX monomer as in claim 4 wherein:

5 a) said strong base is selected from the group consisting
essentially of sodium hydroxide, potassium hydroxide, calcium
hydroxide, magnesium hydroxide, tetrabutylammonium hydroxide and
mixtures thereof.

6. A method of making a mono-substituted FOX as in claim 5
wherein:

5 a) said strong base is potassium hydroxide and said phase
transfer catalyst is tetrabutylammonium bromide, and said
temperature is in the range of from about 80°C to about 85°C.

7. A mono-substituted fluorinated oxetane monomer having the
structure:



Where: n is 1 to 3;

5 R is methyl or ethyl; and

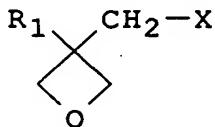
R_f is linear or branched chain fluorinated alkyl
and isoalkyl having from 1 to 20 carbons or
oxaperfluorinated polyether, having from 4 to
about 60 carbons.

8. A mono-substituted fluorinated oxetane monomer as in claim 7
including 3-(2,2,2-trifluoroethoxymethyl)-3-methyloxetane; 3-(2,
2, 3, 3, 4, 4, 4-heptafluorobutoxymethyl)-3-methyloxetane; 3-(2,
2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 8-
5 pentadecafluorooctyloxymethyl)-3-methyloxetane; 3-(3, 3, 4, 4,

5, 5, 6, 6, 7, 7, 8, 8, 8-tridecafluoroctyloxymethyl)-3-methyloxetane; 3-(3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10, 10-heptadecafluorodecyloxymethyl)-3-methyloxetane; 3-(3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10, 11, 11, 12, 12, 12-heneicosafafluorododecyloxymethyl)-3-methyloxetane; and mixtures thereof.

9. A mono-substituted fluorinated oxetane (FOX) monomer produced by the process comprising the steps of:

a) providing a mono-substituted oxetane premonomer having the structure:



where R₁ is selected from the group consisting of methyl and ethyl and X is a leaving group selected from the group consisting of bromo, chloro, iodo and aryl sulfonate, said premonomer being diluted in a solvent to provide a premonomer solution;

b) suspending a dispersion of a strong base in an aprotic solvent to provide a strong base suspension;

c) adding a fluorinated alcohol to said strong base suspension to produce a fluorinated alkoxide solution; and

d) adding said premonomer solution to said fluorinated alkoxide while heating the reaction mixture to a temperature of about 50 to about 125°C to permit a displacement reaction whereby said fluorinated alkoxide displaces said leaving group to produce the mono-substituted fluorinated oxetane monomer.

10. A mono-substituted FOX monomer produced by the process as in claim 9 which includes the steps of:

a) quenching the displacement reaction upon consumption of the starting materials; and

5 b) separating the mono-substituted fluorinated oxetane monomer product from the reaction mixture.

11. A mono-substituted FOX monomer produced by the process as in claim 9 wherein:

5 a) said fluorinated alcohol is selected from the group consisting essentially of trifluoroethanol, heptafluorobutanol, pentadecafluoroctanol, tridecafluoroctanol, other fluorinated alcohols having the following formulas:

10

- a) $\text{HO}(\text{CH}_2)_n(\text{CF}_2)_x\text{-F}$;
- b) $\text{HOCH}_2\text{CF}_2(\text{OCF}_2\text{CF}_2)_x\text{-F}$;
- c) $\text{HOCH}_2\text{CF}(\text{OCF}_2\text{CF})_x\text{-F}$;
 | |
 F_3C CF_3

15 wherein n is 1 to 3 and x is 1 to 20 and mixtures thereof.

12. A mono-substituted FOX monomer produced by the process as in claim 11 wherein:

5 a) said strong base is selected from the group consisting essentially of sodium hydride, potassium hydride, potassium t-butoxide, calcium hydride, sodium hydroxide, potassium hydroxide, NaNH_2 , n-butyl lithium and lithium diisopropylamide.

13. A mono-substituted FOX monomer produced by the process as in claim 12. wherein:

5 a) said solvent is selected from the group consisting essentially of dimethylformamide (DMF), dimethylacetamide, DMSO, hexamethylene phosphoramide (HMPA) and mixtures thereof.

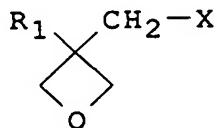
14.. A mono-substituted FOX monomer produced by the process as in claim 13 wherein:

5 a) said temperature is from about 75 to about 85°C.

15. A mono-substituted fluorinated monomer produced by the

process comprising the steps of:

a) providing a mono-substituted oxetane premonomer having the structure:



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where R_1 is selected from the group consisting of methyl and ethyl and X is a leaving group selected from the group consisting of bromo, chloro, iodo and aryl sulfonate, said premonomer being dissolved in a solvent to provide a premonomer solution;

10 b) charging a reaction vessel with an aqueous solution of said mono-substituted oxetane premonomer, a fluoroalcohol, a phase transfer catalyst and a strong base;

c) heating said solution to a temperature of 80-85°C until reaction is complete to form the FOX monomer as a separate
15 organic layer;

d) cooling the reaction mixture; and

e) separating the mono-substituted fluorinated oxetane monomer as an organic layer from the aqueous reaction mixture.

16. A mono-substituted fluorinated monomer produced by the process of claim 15 wherein:

a) said phase transfer catalyst is selected from the group consisting essentially of tetrabutylammonium bromide, tetraethylammonium bromide, trimethylbutylammonium bromide, 5 tetratmethylammonium iodide, cetyltributylammonium bromide, crown ethers, glycols and mixtures thereof.

17. A mono-substituted fluorinated monomer produced by the process of claim 16 wherein:

a) said fluorinated alcohol is selected from the group consisting essentially of trifluoroethanol, heptafluorobutanol, 5 pentadecafluoroctanol, tridecafluoroctanol, other fluorinated

alcohols having the following formulas:

10 a) HO(CH₂)_n(CF₂)_x-F ;
 b) HOCH₂CF₂(OCF₂CF₂)_x-F ;
 c) HOCH₂CF(OCF₂CF)_x-F ;

15 wherein n is 1 to about 3 and x is 1 to about 20 and mixtures
thereof.

18. A mono-substituted fluorinated monomer produced by the process of claim 17 wherein:

5 a) said strong base is selected from the group consisting essentially of sodium hydroxide and potassium hydroxide, calcium hydroxide, magnesium hydroxide, tetrabutylammonium hydroxide and mixtures thereof.

19. A mono-substituted fluorinated monomer produced by the process of claim 18 wherein:

a) said strong base is potassium hydroxide and said phase transfer catalyst is tetrabutylammonium bromide.